# the Atom

Los Alamos Scientific Laboratory
December, 1978

# the Atom

VOL. 15, NUMBER 10
DECEMBER 1978


ON THE COVER:

A worker is silhouetted against some of the 600 tons of reinforcing steel that are required in the target building, one of five structures in the Antares laser facility now under construction at Los Alamos. This building will house the optical components required to irradiate fusion targets, and will also house ancillary diagnostic equipment. Other photos by LeRoy N. Sanchez are on each side of the back cover and on page 24.


**Editor**
Jeffery L. Pederson

**Photography**
Bill Jack Rodgers, LeRoy N. Sanchez

**Public Information Officer**
William Richmond

**Public Relations Department Head**
David L. Moore

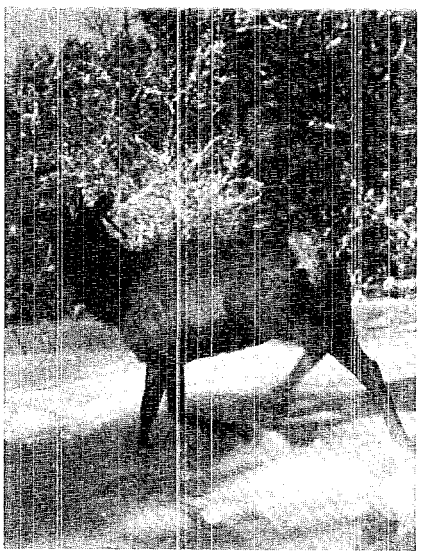
**Publisher**

Published monthly except for July-August and January-February issues by the University of California, Los Alamos Scientific Laboratory, Office of Public Information. Address mail to MS 318, P.O. Box 1663, Los Alamos, New Mexico 87545. Second class postage paid at Los Alamos, N.M. Printed by Panorama Press, Albuquerque, N.M. ISSN 0004-7023.

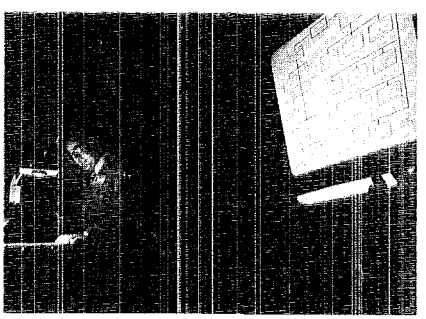
**Office**

1325 Trinity Drive, Telephone (505) 667-6101. Address inter-office mail to PUB-1, MS 318.

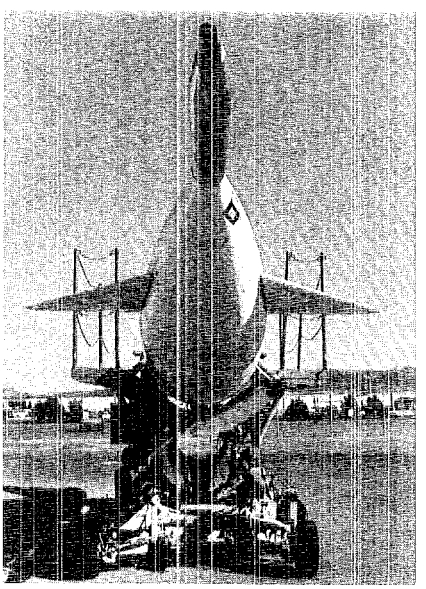
# In this issue:











# *Tracking the elk, magnificent neighbors*

A radio collar is positioned by Les Eberhart, H-12, while an elk lies motionless. One of Gary White's theories is that to maintain an exchange of genes between different populations, the male elk become nomads, while the female tend to wander less.

Photos by Group H-12

By Jeff Pederson

By the turn of the century, the native elk herds in the Jemez Mountains country had nearly disappeared — victims of human pressures and hunting. But a reintroduction of the species in 1966 has proven successful, and many of the animals that now roam Bandelier National Monument, Department of Energy land, Santa Fe National Forest, and the Baca land grant are descendants of the 58 head of Yellowstone elk released near Valle Canyon.

The elk is the largest New Mexico game animal and some bulls have been known to weigh 1,000 pounds, though 600 to 800 pounds is more normal. They live perhaps a dozen years, but can attain the quarter-century mark; each day, an elk will eat 10 pounds of forage during the late evening and early morning hours. Mature bulls stay in bachelor groups or as individuals, except during the mating season, and herds are dominated by an older cow in their daily activities. The animals prefer the higher mountain ranges, but are adaptable and will descend in winter; the distance depending on the depth of the snows.

Movements of individual animals and herds through the Pajarito Plateau and Jemez country are of interest to researchers of the Environmental Science Group, H-12, whose job is to trap and tag elk and monitor them, using radio collars and visual sightings. Interestingly, the Bandelier elk and those that frequent Laboratory lands are of different herds.

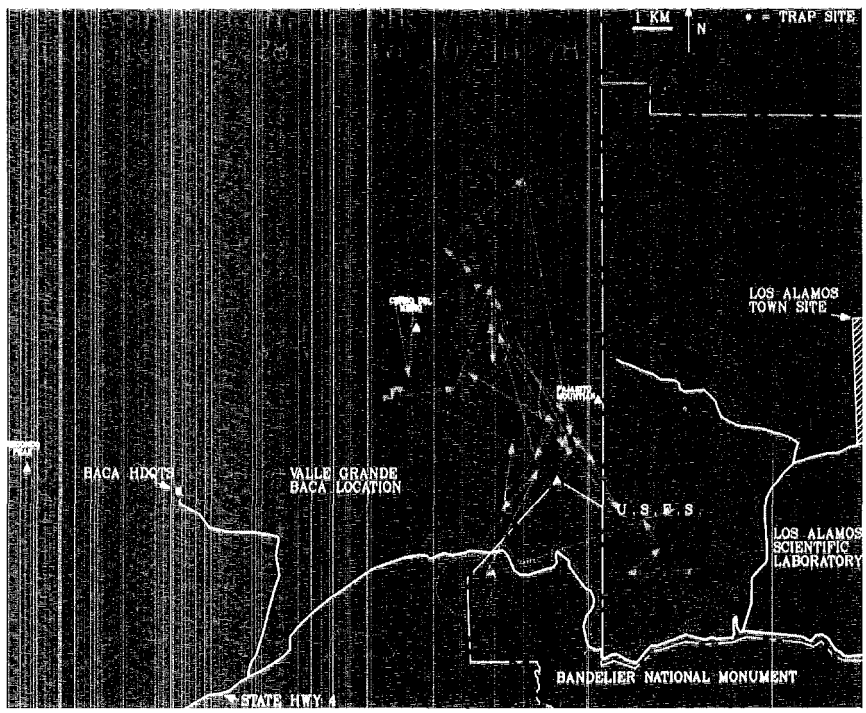
### Law requires study

"By law, we must know the impact of Laboratory development

on the animals that occupy Department of Energy lands," said Gary White, wildlife biologist in H-12, a group in the Health Research (H) Division. "In Bandelier, the elk tend to migrate down to the Rio Grande in the winter, at the 5,500 foot elevation, but we've found the herds that visit Laboratory lands stay in higher country during the winter, often grazing on alfalfa in an abandoned gravel pit near West Jemez Road, about 7,300 feet. Fences, people, and cars make for changes in their use of habitat and movements; they usually go to S-Site in the evenings, then to higher ground during the day. In other areas of the Laboratory, elk are permanent winter residents."

Elk herds of 250 animals have been sighted in the Baca grant, in and around the Valles caldera; there could be as many as 1,000 elk in the vicinity. Yet, when a recent environmental impact statement was issued by the Laboratory, it became apparent that little was known about large herbivore populations; only four sentences of the report discussed elk. (Deer, a separate subject, have been studied in the past and were the subject of an *Atom* article in 1977.)

More should be known. Areas used by elk are known to contain such environmental contaminants as depleted uranium, high explosives, and other potentially hazardous substances. The La Mesa fire of 1977 has created some 3,000 acres of highly desirable elk wintering range on Laboratory lands. Studies which detail the interaction of wildlife and a science facility are mandated in the charter of the Los Alamos National Environmental Research Park (see *The Atom*, July-August, 1977). Finally, the recent announcement by Public Service Company and Union Oil to drill for geothermal energy on a part of the Baca grant could affect elk populations in the Jemez. Information on habitats, seasonal movements, and population changes is essential to document effects, should there be any. H-12 would also like to develop a statistical technology to determine changes in the elk herd density -- gaining such knowledge has been a long-time problem for wildlife management agencies.




**A female elk's behavior, as mapped by H-12, is fairly typical: she left the Forest Service land as the snows retreated, spent a lot of time in the Cerro del Medio area during calving season, and headed again for lower country with the advent of winter.**

### Winter trapping

"The winter makes them hungry enough to go to our modified Clover traps, where we use alfalfa as bait," White said. "The traps are fitted with a nylon netting, and as the animal enters, it trips a cord that closes the door. Elk are strong enough that they can take a trap and turn it upside down. That's why we use cable tie-downs with heavy springs to hold the trap, but also let it have some give."

When an elk is caught (traps are checked each morning), an estimate is made of the animal's weight and a dose of Rompun, a horse tranquilizer, is measured into a syringe on the end of a pole. About one cubic centimeter is used for each 100 pounds of body weight. The animal is poked in the rear end with the pole and the sedative is injected; when the elk is docile (after a few minutes), it is set up on its brisket to avoid buildup of lung fluids and stomach gas, and to ease normal breathing. A collar fitted with a radio transmitter can then be attached, to be later used for monitoring of the elk's movements. The collars are carefully fitted to the animals to allow for

*The Jemez country elk were extinct for 60 years; reintroduction was in 1966*

*'Fences, people and cars make for changes in their use of habitat and movements'*

expansion of the neck during normal growth, and during the rutting season in the case of males. Eartags can be affixed so later visual identification of the animal is a simpler job.

A penicillin-type antibiotic is then administered to the elk to ease the stress from trapping, and to aid the animal's bodily defenses which were lowered during sedation. Once the Rompun wears off, the elk loses no time in making tracks away from its human acquaintances.

Winter is the best time to tag elk; they seek the alfalfa-baited traps when their natural food supply is covered by the snows. Between January and May of 1978, a total of 23 elk were trapped and marked. Sixteen of these were equipped with radio collars and all were given eartags. The radio-collared elk are located weekly, and their positions mapped, using receivers that can monitor a variety of frequencies -- a different signal from each animal. Researchers try to visually spot the marked elk every month, using a pickup truck when convenient, trekking afoot, and at other times flying in a radio-equipped Ross Beaver aircraft, a World War II-vintage plane with antennae on its wing struts.

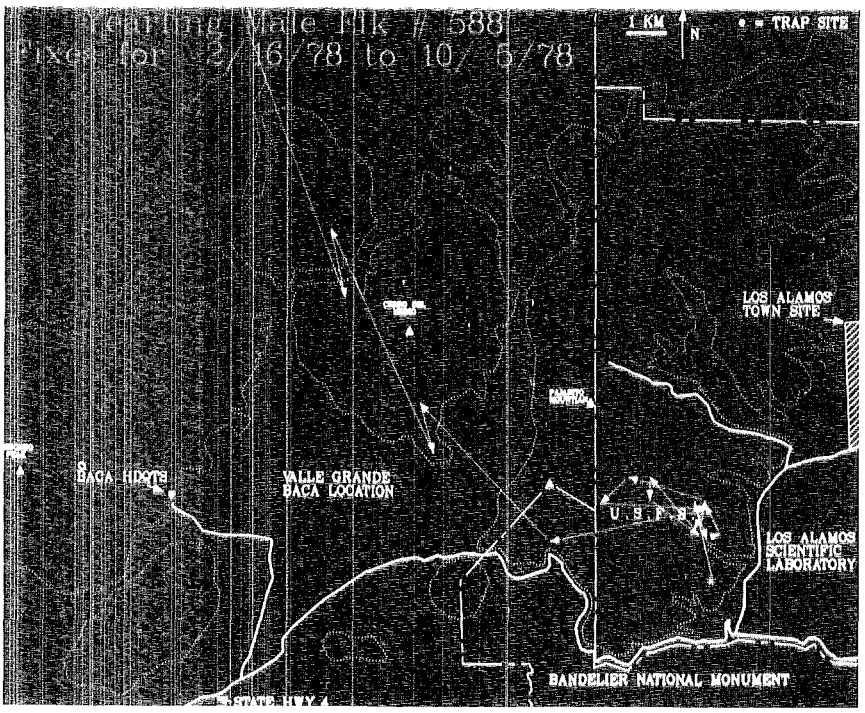
Most of the difficult leg work has been done by Russell Ward and Bruce Weber, cooperative students from the Department of Wildlife and Fisheries Science, New Mexico State University.

### Far-ranging elk

"We have difficulty tracking an animal that really moves around," said White, "and we occasionally can't find them when they stay in a canyon or take off for the high country. We recently located an elk from the air that we hadn't seen for months. He was healthy, and roaming the Polvadera Peak area. We found one animal near the Encino fire lookout station, months after we'd lost contact. Several weeks later, it was probably shot by a hunter and we found it dead in a deep canyon. We found another calf dead in the Jemez meadow this summer, and it had probably been struck by lightning. The other 14 elk we have radio-collared are all doing fine." A computer plots the weekly fixes on a master map of the region after locations have been machine-coded.

Do you think you'd like the elk-tracking job of an outdoor biologist? Some of the work, though scientifically valuable, is not particularly inviting; it involves counting elk pellet groups (excrement), a procedure that supplies data on the animal population. In the fall of 1977, for instance, some 50 pellet group plots were cleared in burned areas, meadows, stands of mixed conifers, and alfalfa habitats. The 120 deer pellet group plots established in 1975 also help to determine changes in the elk population. Plots are read in spring and fall, and the pellet groups are removed. New statistical methods, based on the negative binomial distribution, helps H-12 to analyze the data.

"We now have 170 areas where we count pellet groups," White said. "We stake an area four by 22 meters. As a general rule, the number of deer or elk equals the number of pellet groups per plot, multiplied by the total area, then divided by the area sampled times




**A yearling male elk was noted in the Forest Service lands near West Jemez Road in the early part of 1978, and he later headed north -- off the map. Such behavior may indicate that males are nomadic, and their wanderings are part of nature's gene exchange between elk populations.**

the defecation rate times the deposition period. This is a standard wildlife formula for estimating population density."

### 1966 descendants

What are some of the conclusions reached so far from the elk study?

"We suspect that 'our' LASL elk are all descendants of the 1966 introduction," said White. "They don't totally mingle with other elk using the Baca grant, nor with the Bandelier herd. They do, however, utilize different parts of all these lands, but mostly the Baca grant, the Forest Service land, and part of Laboratory sites."

Only one LASL elk has been known to have been in Bandelier. This winter, in a cooperative program with New Mexico State University (NMSU), the National Park Service, the U.S. Forest Service, and the Baca Land and Cattle Company, a team will seek to learn more information about elk using the national monument. LASL will supply equipment; instructor Walt Conley of NMSU and graduate students will do the work to see if the theory of "discrete herds" can be further proven.

The Cerro del Medio region of the Baca grant, a new clearcut in the Jemez that now sustains a great deal of underbrush, is a

*A collar with a transmitter is affixed and an antibiotic is administered*

Technician Elton Karlen, H-12, and cooperative student Russell Ward work with a drugged animal in the Jemez Mountains. The study helps to show migration patterns of elk herds and is part of research conducted in conjunction with the Los Alamos National Environmental Research Park, dedicated in 1977.

**An elk in the special LASL trap is given an injection of Rompun before the animal is tagged and collared. Administering the relaxant is Russell Ward, a cooperative student from New Mexico State University.**

popular calving area for the LASL elk. The animals in the winter tend to visit the alfalfa field along West Jemez Road near the Laboratory, and hang around the high country and mountain ridges in the late summer.

"The ones we've tracked so far haven't migrated to the Union Oil-Public Service Company geothermal site," said White. "Either they don't like the activity there, or they just don't normally go there."

### Gene exchange

To maintain an exchange of genes between elk populations, the young male elk most likely become nomadic at times, evidence shows. One male, for instance, stayed on the Forest Service land for a time and then headed north at a good clip, and his tracks soon left the boundaries of the tracking map. The same thing happened with another male elk. Patterns will be closely monitored this winter, with surveillance over a 24-hour period to determine elk use on government land and to monitor elk movements when in proximity to human disturbances.

"We've found," White continued, "that elk use on Department of Energy and nearby lands has increased since the 58 animals were introduced here 12 years ago. Burned or logged areas are heavily used for summer calving and winter foraging. Most elk migrate to higher country in the summer and do not use government lands. Seasonal migration pathways are narrow, and include Forest Service, DOE, and private lands.

"We also feel we can capture and track these large animals in the Los Alamos area with success, and we've found that LASL elk do not move toward the Rio Grande in winter as the Bandelier herd does, but stay in higher country — most likely because of the Laboratory, roads, people, buildings, and fences . . ."

### Geothermal impact?

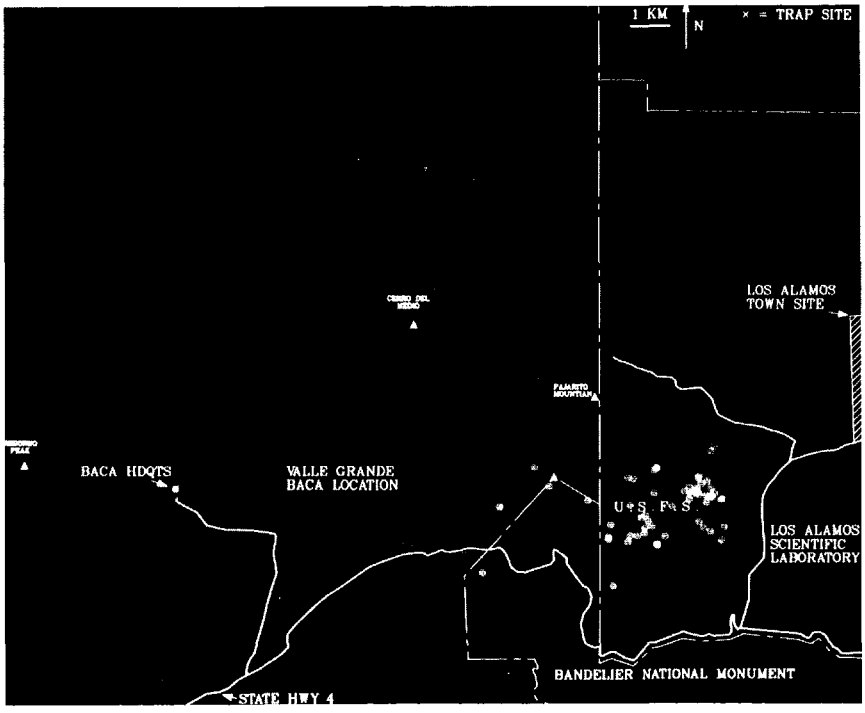
The question of geothermal energy development and its impact on summer elk habits is yet unknown; the H-12 study does not now include the site. Continued monitoring of pellet group plots will help to show population densities, as will the capturing and tracking of elk near the energy site.

Other changes in the elk population could occur as a result of the La Mesa fire, which created a much more extensive winter habitat than had existed. It is now possible for the elk to move from their summer range in the Valle Grande to their winter ranges on LASL land without being molested by hunters. But more habitat may signal an increase in elk population, without hunting as a means of control.

You're invited to help H-12 keep track of the animals. If you see a deer or elk with eartags or a radio collar, note its location and call 667-6682. "Our data is more valuable the longer we have a trace on an individual animal," White said.

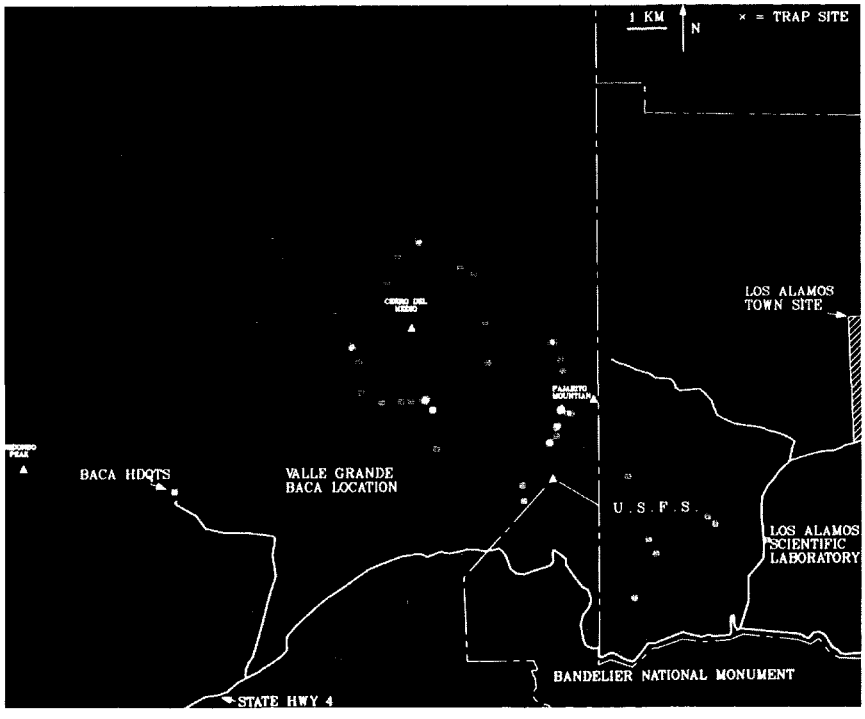
*The La Mesa fire of 1977 has created 3,000 acres of highly desirable elk wintering range*

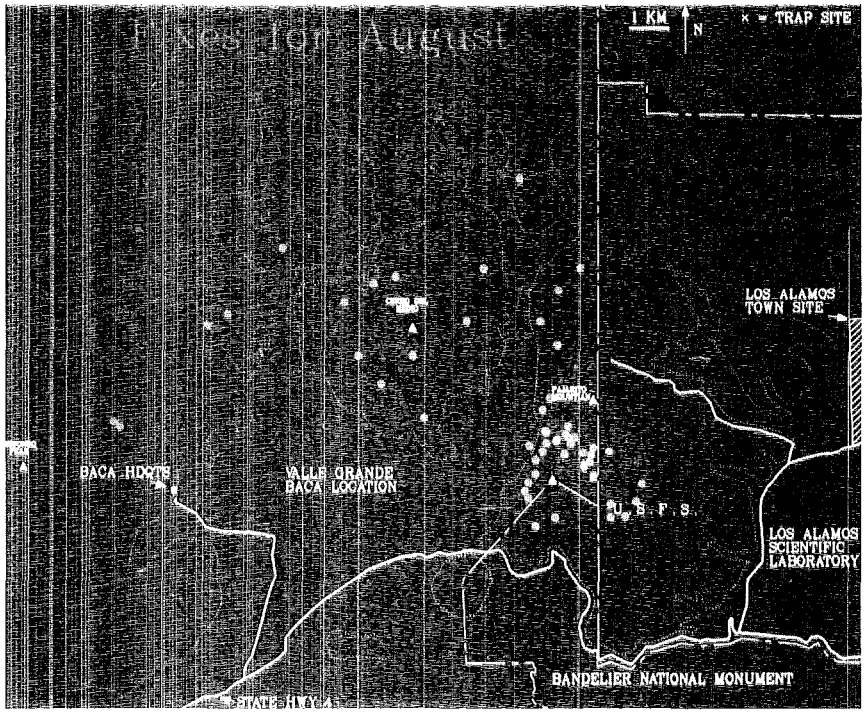
Ear tags streaming, an elk heads back to the mountains — and freedom.



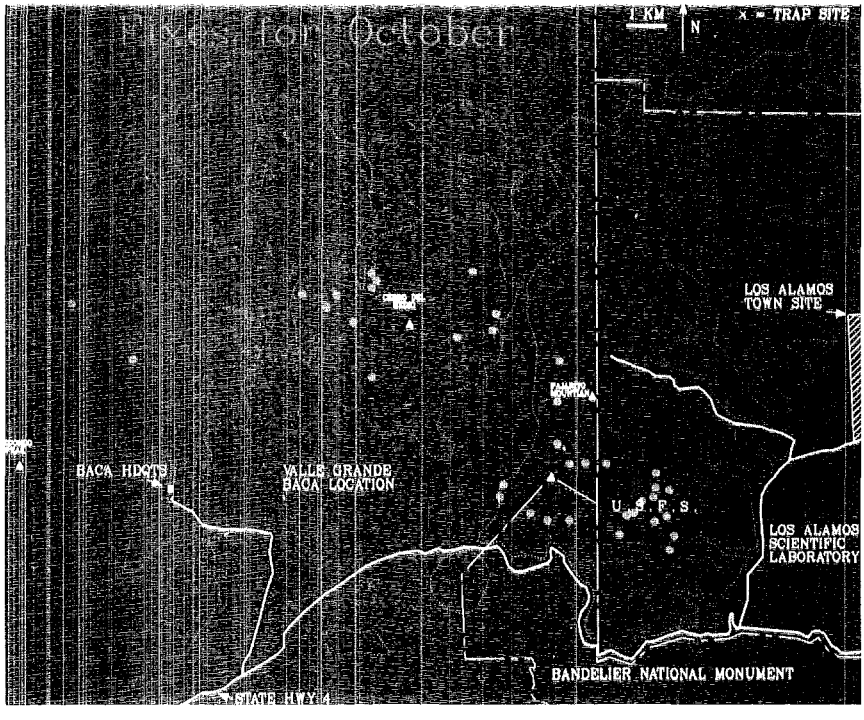

*The young male elk are likely to be nomadic, to maintain an exchange of genes*

Elk positions, shown by light circles on the maps, were plotted with radio collars and portable antennae. In March, some animals are in the Baca grant but most are still on the lower east slope of the Jemez range, near Los Alamos Scientific Laboratory lands. Fixes plotted for May show the animals have really spread out, and many have headed toward the Cerro del Medio (a new






clearcut area) in the Baca grant, a popular calving location. The elk stay in the high country through the summer, and in August they are clustering on the west side of Pajarito mountain. By October, they have scattered again, and several elk have headed toward the lower Forest Service land, while others remain in the Baca grant.




*More habitat may signal an increase in elk, without hunting as a control*

# Rosen reports to meson facility users

**Louis Rosen, leader of the Medium Energy Physics (MP) Division: "We can't be an island of prosperity in a sea of despair."**

**Photos by LeRoy N. Sanchez**

"We have to do more than we have in the past to tell Congress, the executive branch, and society overall what we are doing. We do beautiful science; we do terrible public relations."

So said Louis Rosen, leader of the division that operates the Clinton P. Anderson Meson Physics Facility (LAMPF), during a talk to the twelfth annual LAMPF Users Group meeting here November 13. The half-mile LAMPF accelerator is used by researchers from a variety of countries, and the Users Group claims 1,000 members – more than 200 of whom were on hand for the 1978 conference.

### No island

"I do not look for the present change in administration to affect in any deleterious way" the operations of LAMPF, said Rosen, referring to the resignation of Los Alamos Scientific Laboratory Director Harold Agnew, to take effect March 1, 1979. But speaking of LAMPF nuclear science in general, Rosen added, "We can't have an island of prosperity in a sea of despair." Research budgets have been declining across the country, he said.

Interaction between LAMPF and the Users Group was "at least as good the past year as I have seen," Rosen said, due in main part to the on-site presence of Users Group chairman John Allred for much of the year. Consideration should be given to a group deputy chairman position, said Rosen, so that the Users Group may be represented at LAMPF in the chairman's absence.

Present LAMPF budgets are liveable, as a result of a recent Congressional action that appropriated $2 million for the facility this fiscal year, said the leader of the Medium Energy Physics (MP) Division, which operates LAMPF. This means operations will not have to be decreased 10 to 15 per cent this year as was once anticipated: "Last year was the best ever. We didn't have to collect Coke bottles to meet our expenses in September," he quipped. During fiscal 1978, LAMPF scheduled and achieved the use of 50 per cent of the beam time for research. Operations are planned at a level above that of last year. "Where we are, eight per cent more money means 20 per cent more research time," he said.

Rosen also referred to a letter he wrote this year, in support of university funding for research, to the federal Office of Management and Budget, after he visited Pennsylvania State University, his alma mater, as a distinguished alumnus: "Science is not prospering . . . I worry about the kind of world my grandchildren are likely to face." The Government Accounting Office plans to audit all high-energy physics programs this year; nuclear physics could be next in line. "We have to be able to justify the resources we utilize," said Rosen of LAMPF and taxpayers' money, adding that all those concerned with LAMPF programs or nuclear science should make a greater effort to explain what they are doing, and how it affects the well-being of everyone.

Turning to safety considerations, Rosen noted that the LAMPF record was excellent compared to facilities with comparable hazards, but also noted the lost time accident rate at LAMPF was above the Laboratory average, and that two industrial accidents were sufficiently serious to merit investigations. Unique monitoring systems at LAMPF enhance the safety picture, he said, continuing, "It behooves us to demonstrate we can live safely in close proximity to high-level radiation." By so doing, we can facilitate the acceptance of nuclear power, which Rosen believes to be absolutely essential if we are to maintain our standard of life.

### Treaty prospects

LAMPF has experienced good success with new programs, said Rosen, who was "very encouraged" with the pion cancer treatment program, isotope production, radiation damage studies, and the Weapons Neutron Research Facility (WNR). Use of the latter, however, especially if a total test ban treaty is approved and bars all nuclear warhead testing, could affect use of the accelerator. The WNR, in fact, was requested years ago in anticipation of a treaty, and a proton storage ring is now being funded to extend the use of the WNR for

national defense and also for basic research, using pulsed neutrons.

"It became apparent that pulsed neutrons would give us a new national capability not available elsewhere or from reactors," said Rosen to the audience, which included two Russian researchers. LAMPF can make available 400 of its 1,000 microamperes of current for the WNR and proton storage ring. John Deutch of the Department of Energy has said that as a tradeoff, LAMPF's operation could be extended from the present six months a year to seven or eight months. "The Users Group board said essentially we could live with it. My personal recommendations are to proceed with a 100 microampere capability for the proton storage ring, which will teach us about the desirability and feasibility of going to higher intensities."

Next summer, a 10-day workshop on topics and experiments for accelerators will help determine which machines can best be used for certain research. Experiments with the proton storage ring, for instance, will let researchers know whether still higher beam intensities at LAMPF would be worth the time and effort.

### Allocation

So far, the original goal of allocating no more than 50 per cent of the LAMPF beam time to Los Alamos scientists has been met. During fiscal 1978, LASL used 41 per cent; university users were allocated 44 per cent; and 14 per cent went to others.

Computing support was also mentioned by Rosen. "We cannot meet all our needs (with the LASL Central Computing Facility) so we will try to build a capability with medium-sized computers for data analysis," he noted. "This fiscal year, we have funds for the building to house a computer complex."

### The future

John Allred, Users Group chairman and researcher at the University of Houston, outlined administrative aspects of LAMPF during the first afternoon session. Many of his comments concerned broadening the base of the LAMPF Technical Advisory Panel (TAP).

Paying particular attention to services and programs initiated by the students of the Users Group, Allred singled out the Young Scientists Invited Lectures Program, which has drawn such scientific giants as Hans Bethe, Stan Ulam, Norris Bradbury, and Stanley Livingston. He said the program has broadened student understanding of the technical side to LAMPF experiments.

In general, Allred lauded the students for their enthusiasm in implementing programs that are geared toward scientific and administrative advancement. He said also that when students needed health insurance and other benefits not granted to non-LASL staff members, they organized and looked toward the private sector for solutions. And they came up with a program to rival that of the Laboratory.

*Recent Congressional action appropriated $2 million for the facility this fiscal year*

An afternoon symposium honoring Rosen was given November 13 and included the presentation of papers from Lawrence Wilets, University of Washington; Earle Lomon, Massachusetts Institute of Technology; Jose Sala, M.D., University of New Mexico; and Edward Knapp, Los Alamos Scientific Laboratory. A general business meeting was included in the session. November 14, Users Group members heard from authors of invited papers and then split up for meetings of working groups.

**Peter Carruthers, leader of the Theoretical (T) Division: Research funding is facing problems.**

# Of history, budgets, and science funding

The accelerator now called the Clinton P. Anderson Meson Physics Facility (LAMPF) faced many tortuous challenges in its development, before it began operating in 1972, said George Rogosa, who is the director of the division of nuclear physics for the Department of Energy. Funding now looks stable, but there was a time when the status of LAMPF could be labeled "all hell breaks loose," he said.

A conference held in April, 1962, at the University of California at Los Angeles set the stage for proposing a LAMPF-type national accelerator. In December of 1963, the Bethe panel — meeting when Rogosa was the communications officer for the Atomic Energy Commission (AEC) — favored building a meson facility at a national institution, and also favored a variable energy machine.

In July, 1964, a general advisory committee issued a report "not really in favor of LAMPF." That September, Louis Rosen, now head of the division which operates the accelerator, wrote to the Office of Management and Budget and outlined the research benefits of such a project. A cost estimate pegged LAMPF's construction needs at $55 million (a figure which held), although in some AEC circles it was thought that $70 to $75 million was a more realistic figure.

Also in September, 1964, the Laboratory Director, Norris Bradbury, said that Los Alamos would stand on the LAMPF proposal. Rosen, while remaining alternate leader of the Physics (P) Division, was appointed acting director of the project. In March, 1976, Rosen told the Joint Committee on Atomic Energy that LAMPF was essential as a bridge between particle, and nuclear, physics.

Questions, however, were raised nationally in December of 1965. There was a cyclotron at Columbia University. The LAMPF cost could be reduced by $10 million if the intensity was reduced from 850 to 500 million electron volts. And what of the separated orbit cyclotron at Oak Ridge?

### "Hell broke loose"

Hell was said to have broken loose in September, 1968. Money was being released, but $26 million was withheld from the project — half its cost. Director Bradbury wrote to Washington, "The situation here is really desparate . . . Rosen wants to resign . . . the matter has not hit the local press but is bound to pretty soon and then all hell will really break loose."

The President released the funds, and Rogosa concluded, "We've finally attained the state of budgetary peace."

The DOE nuclear physics budget, said Rogosa, is currently $92.7 million for fiscal 1979, and "LAMPF gets a good share of this." The budget is up from $80.4 million in fiscal 1978, with the lion's share of the money going for operating expenses.

Expenses of LAMPF operations are funded at $21 million yearly, and research activities at $3 million, Rogosa said. Most of the LAMPF money, he continued, goes to users. He suggested, as a means of celebrating Rosen's 60th birthday, that each user group account be given an additional $10,000 in funds this year, and that the funds be from NSF. Future funding prospects will most likely be stable, with nuclear physics given a modest step increase and then the total amount "leveled" over the next four to five years.

*The stage was set in April, 1962, at the University of California at Los Angeles*

### NSF view

Other funding increases will be modest at most, said Howel Pugh, head of the nuclear science section,

National Science Foundation (NSF). While most LAMPF money comes from the Department of Energy, the other 20 per cent comes from NSF. But that organization's budget will only increase about six per cent a year, or less than the cost of living, said Pugh.

"It's clear we're not in a rosy budget situation," he said. Some programs will be pursued at the expense of others, and Pugh said it was unfortunate that NSF couldn't support LAMPF more at a time when the complex machine was reaching a period of optimal power and operation. Also important in the NSF program are electron accelerators at Stanford and Illinois, he added.

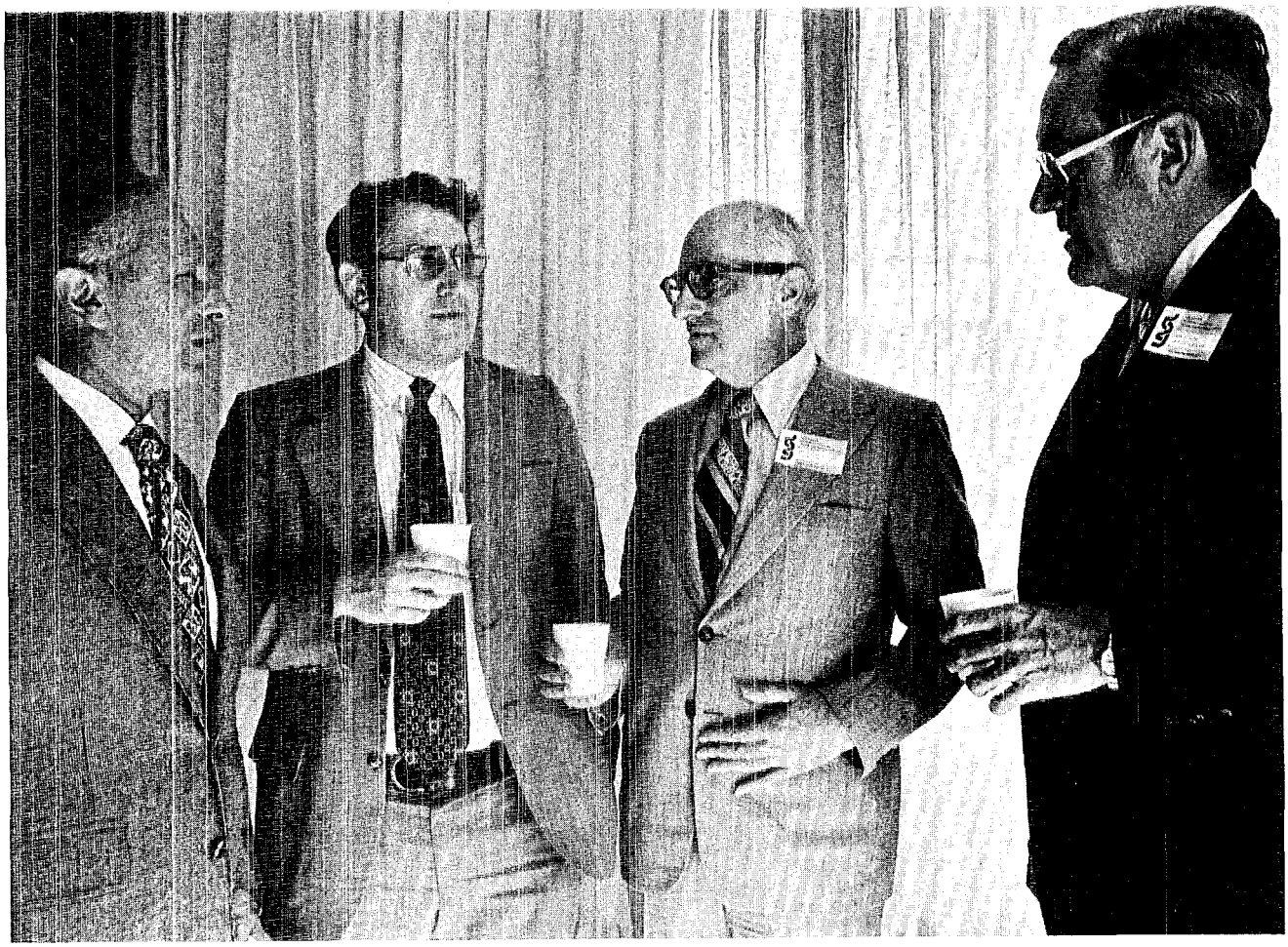
### Science funding

There is a "serious problem" with funding research in certain DOE programmatic energy divisions, according to Peter Carruthers, leader of the Theoretical (T) Division and the man who gave a general welcome to the LAMPF Users Group.

Money for research at LASL comes predominantly from the weapons side of the funding sheet, he said. Supporting research funds comprise a significant fraction of support of LASL divisions which include Theoretical (T); Physics (P); Health Research (H); Basic and Applied Geosciences (G); Electronics (E); Chemistry-Nuclear Chemistry (CNC); and Chemistry-Materials Science (CMB).

Additionally, the weapons supporting research funding at LASL has dropped, said Carruthers, from 30 per cent of the total in 1972 to a projected 15 per cent in 1981. The person who will be Director in Harold Agnew's wake must face the problem of research funding versus applied funding, he added, saying that if the research aspect is gone from the Laboratory, the vitality of Los Alamos will similarity suffer.

High-level appointments in Washington of science program managers are "encouraging," Carruthers said, implying there may be "light at the end of the tunnel."



Conferees at the twelfth annual LAMPF Users Group meeting included (from left) Louis Rosen, MP-Division leader; Howel Pugh, head of the nuclear science section of the National Science Foundation; George Rogosa, director of the division of nuclear physics of the Department of Energy; and John Allred, Users Group chairman, from the University of Houston and LASL.

# Director Harold M. Agnew announces his resignation

Harold M. Agnew, Laboratory Director since 1970 and a LASL employee since 1943, has announced that "it's time to leave," and will resign as of March 1, 1979. The announcement by Agnew, 57, was officially made in a letter dated October 27, 1978, and sent to the University of California President David S. Saxon. Regents of the University, which operates LASL for the Department of Energy (DOE), will appoint a new Director.

"I have been thinking about doing something else," said Agnew in an interview with Public Information Officer Bill Richmond, "and if I am ever going to do it, I want to do it now. I don't want to 'hang on' for the last few years. I have a fear of 'hanging on.' I have seen it happen at other Labs."

Since the Los Alamos Scientific Laboratory is now in excellent shape, it is a good time to put someone younger in charge, the Director noted. He said he was happy and hadn't yet decided what to do. "I am going to get another job and do something," said Agnew. "Something different. I started getting calls as soon as the announcement was made."

As far as funding disparities go between LASL and Lawrence Livermore Laboratory (LLL), "This has been going on for 20 years. It's nothing new," said Agnew. "But it has been giving me heartburn and I'm tired of it."

In his letter to Saxon, Agnew said, "My decision has been influenced by my dissatisfaction with University administration policies and a lack of advocacy for the total LASL program." He cited as another factor the "continuing inequitable distribution of defense program funding by the Department of Energy between LASL and the LLL."

**"I have a fear of hanging on." — Harold M. Agnew.**

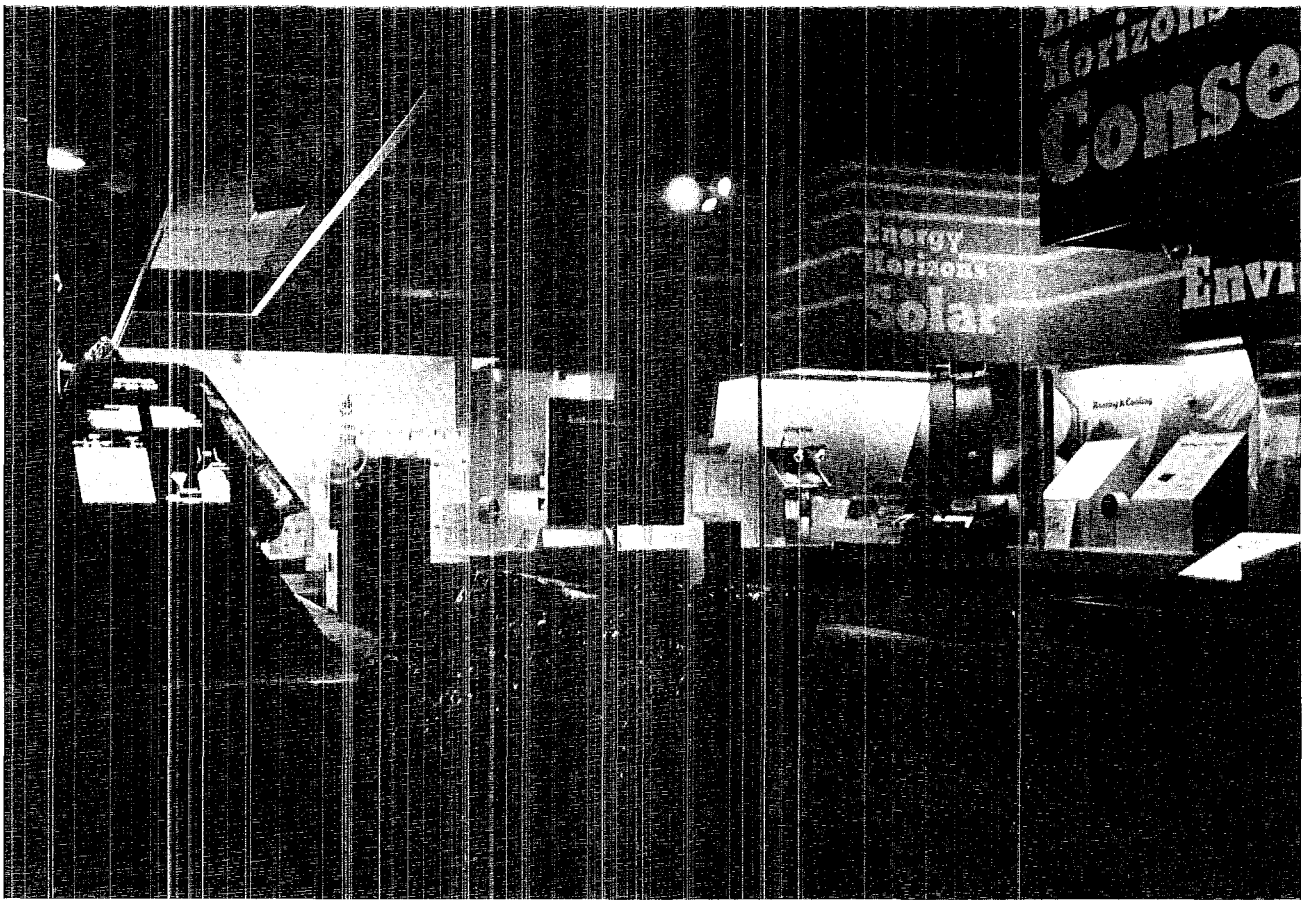
The University Board of Regents will choose a successor, with the DOE to retain final approval. A special joint committee will be making suggestions for finalists to the Director's post; President Saxon will submit between five and fifteen names to the committee, which may consider or suggest others.

Saxon said, "Harold Agnew has provided strong and effective leadership over the past eight years, and I agree completely with him that, as stated in his letter, 'the Laboratory is in first class shape and is so recognized on an international basis.' "

Agnew is the Laboratory's third Director, succeeding J. Robert Oppenheimer (1943-1945) and Norris Bradbury (1945-1970). He was a member of Enrico Fermi's team and worked on the first nuclear fission chain reaction at the University of Chicago in 1942. He flew as a member of the scientific team on the world's first nuclear weapons strike against Hiroshima in 1945, after coming to Los Alamos in 1943 as a physicist.

He earned his Ph.D. in 1949 from the University of Chicago and returned to Los Alamos. From 1961 to 1964, he was scientific advisor to the Supreme Allied Commander in Europe at NATO headquarters in Paris. In 1964, he was named head of the Weapons Physics Division at LASL. He received the E.O. Lawrence Award from the U.S. Atomic Energy Commission in 1966. He is a Fellow of the American Physical Society and the American Association for the Advancement of science, and a member of the National Academy of Engineering.

Agnew has also served two terms in the New Mexico State Senate and is a Woodrow Wilson National Fellow. He is the former chairman, and is a member of, the General Advisory Committee to the Arms. Control and Disarmament Agency.



A single lump of anthracite coal, weighing 2,600 pounds, stands guard over the energy displays.

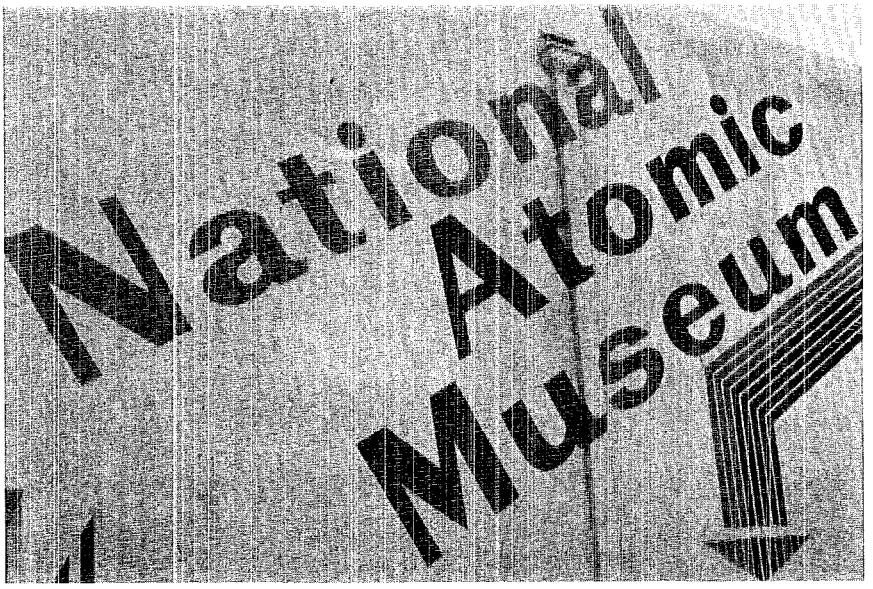
*National Atomic Museum*

# A visit with Hound Dog, anthracite, Trinity, and photovoltaics

Follow Wyoming Boulevard south from I-40 in Albuquerque, and you will reach a small gatehouse at the public entrance to Kirtland Air Force Base-East (formerly Sandia Base). Stop for a courtesy pass and proceed a short distance, still on Wyoming, until on the right you cannot miss the mammoth bulk of a B-52 aircraft stored on an asphalt drydock. You have found the National Atomic Museum.

So have other visitors, 61,647 of whom toured the energy exhibits, the historical displays, and the arrays of nuclear bomb casings and delivery systems in the last year. The Bradbury Science Hall at Los Alamos, in contrast, witnessed

280-millimeter atomic cannon, similar to one that was test fired in Nevada, has recently been moved to the museum grounds with the aid of an overhead crane.




The museum has 17,000 square feet of indoor space at Kirtland Air Force Base-East in Albuquerque.

*'People seem to know already about the Tokamak reactor and solar energy'*

Story and photos by Jeff Pederson

69,886 visitors during the same period.

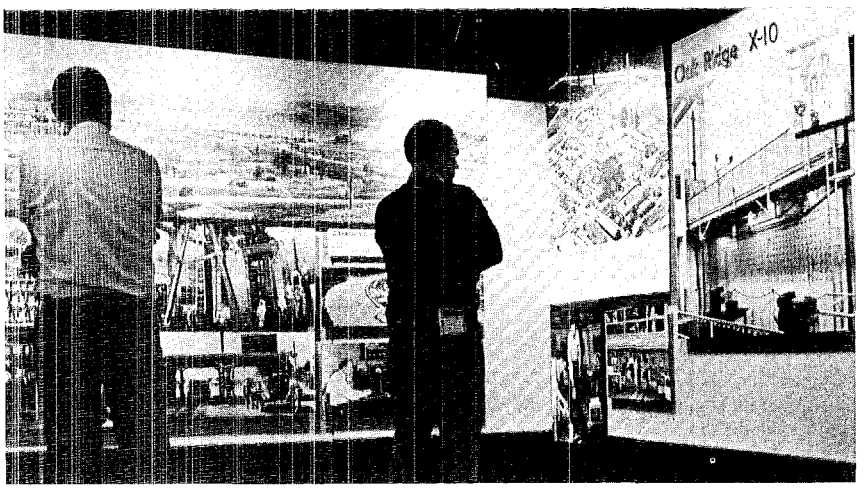
"We have at least one model representative of 75 per cent of the weapons that have been in the nuclear stockpile," said museum director Carrol Canfield. "Some are inside, and some outside, and a lot aren't displayed but are in storage in the Pantex plant in the Texas panhandle."

If you assume that salvaged bomb casings must be handed down by a military branch of the United States government, guess again. A Regulus came from a Navy yard in Seal Beach, California, and a Redstone came from the Redstone arsenal, but the Minuteman was found in San Bernadino, and was procured from the city government there. The museum's Snark came from a movie studio, and the Air Force traded a flyable craft for this very early winged ICBM. On display is a model of a hard to find Nautilus; Jupiter and Corporal missiles await mounting.

"We do have some people who see one of our movies, or step inside, and then want to see no more and wait for their acquaintances to finish their visit," said director Canfield. "But we want people to leave with some idea of nuclear history, how the weapons progressed — we can't just show the weapons, we have to tell them something about them."

### Four foot lump

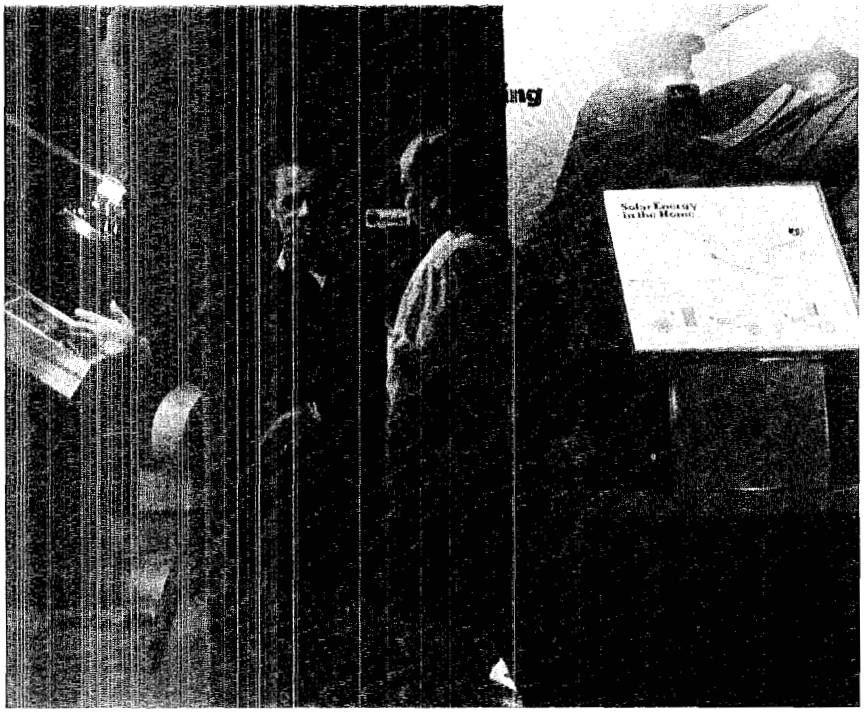
Just inside the museum is an "energy room," where a single lump of anthracite coal, weighing 2,600 pounds, helps to graphically show from where one form of energy comes. Colorful labels identify walk-up displays around the room: solar energy, safety and the environment, conservation, fossil fuels, nuclear fission and uranium mining, and nuclear fusion. The visitor can be a participant in some areas; in the solar realm, for instance, you turn on a light which shines upon photovoltaic panels, which in turn power a television monitor and camera so you can see yourself on display.




Oak Ridge and uranium production history during the second world war are presented through large, mounted photographs.

*'We would include pictures from Hiroshima and Nagasaki in an exhibit designed and developed by the Japanese'*


Sixty of the 220 running feet of panel space is devoted to New Mexico weapons history.



Walk-up exhibits encourage visitors to participate, not merely observe.


Building and testing the first atomic bomb were wartime duties at Los Alamos; detonation was at Trinity site, now part of White Sands Missile Range in New Mexico.

"Mostly what people seem to know about already is the tokamak reactor (used for controlled magnetic fusion energy research)," said Canfield. "That and solar energy. We need also to give them something back, so they can relate to what they already have."

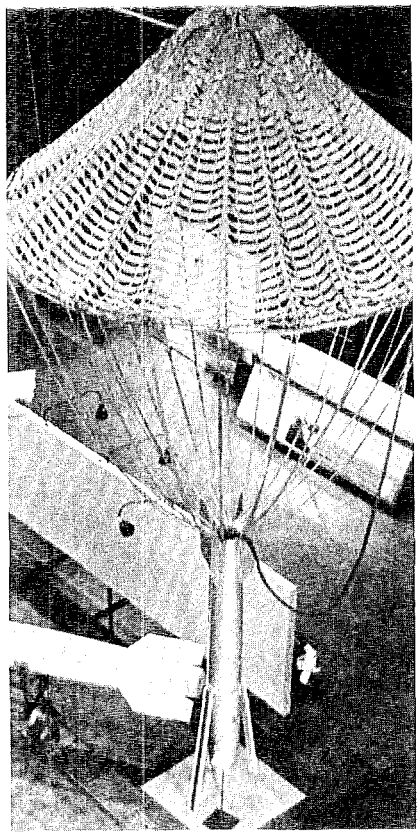
Daily films in the 86-seat theatre include celluloid showings of United States weapons history and recent energy research efforts. Since about half the museum's visitors come in sizeable groups, the theatre is often too small to accommodate everyone.

Just past the energy displays and the theatre begins the photo history of nuclear warfare development -- 60 of the 220 running panel feet concern New Mexico's role, early Los Alamos, Los Alamos Laboratory, and the Trinity test in the Jornada del Muerto. The German scientists are shown at work on their atomic bomb program during World War II. There are pictures from Oak Ridge, where uranium enrichment processes were developed and a wartime lab built. The Hanford works and its reactors are represented in the 1940s push for a fission weapon.

The museum has 13,260 square feet of exhibit space and 17,132 square feet overall. Much of that room is devoted to displaying weapons casings, and the indoor display starts just past the photo panels. Nuclear safety is emphasized, and you can find out more about procedures taken to prevent accidents (or what happens if one occurs). "We have pictures taken after a plane crash," said Canfield. "You couldn't tell the plane, but the casing it was carrying is unscathed." One actual casing displayed is from the 1966 incident off Palomares, Spain, when warheads were inadvertently dropped from the sky. A future exhibit will deal with testing.

### Search for 'magic stuff'

Have you old photographs of early weapons days? The museum



The Mark-61 is shown with its deployable parachute.

Where the pictures leave off, the display of nuclear bomb casings begins.

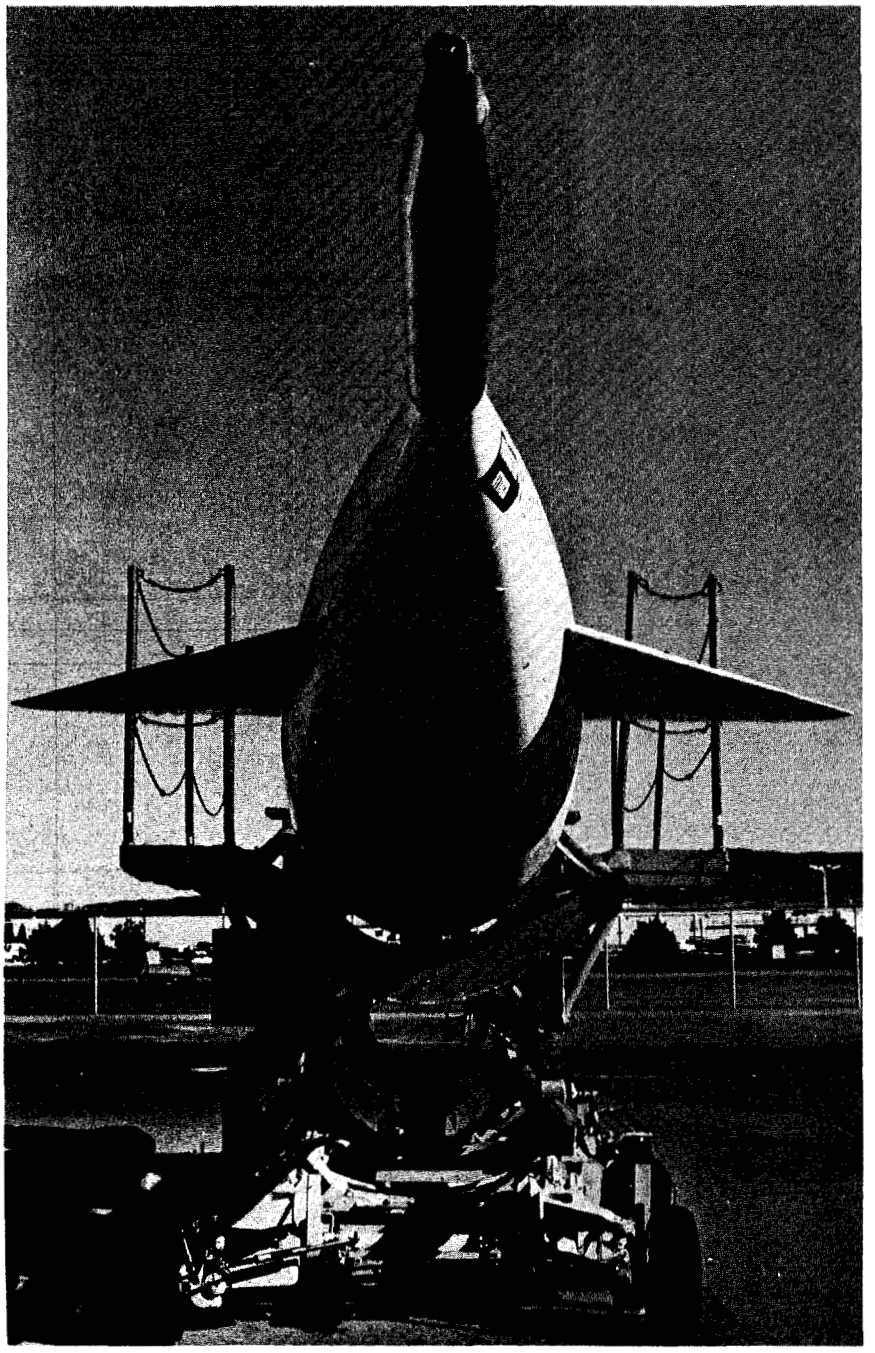
would like to hear from you. "It's hard to find people with magic stuff," said Lynnie Grace, who deals with historical research, design, and public relations at the museum. "We are especially interested in unclassified pictures of handling, loading, storage, and testing . . . things with people in them, action photos of the older days . . . primarily bombs or early missiles." Various wings of the armed services, she explained, took over weapons program details but the bombs themselves were products of the Atomic Energy Commission.

"In particular, we'd really like a picture of the Mark-17 thermonuclear weapon," said Grace, "hopefully shown with the B-36 — that was probably the only thing that test-dropped it. The device weighed 21 tons, and on release, the plane rose up several hundred feet." (Persons can call her at (505) 264-4223, she said.)

For the most part, the National Atomic Museum has avoided the censure of its visitors, although some are taken aback by the subject of nuclear weapons. "What amazes me," said Canfield, "is all the foreign visitors — including the Japanese. Feedback is generally very positive, but sometimes they ask why we do not have pictures of the victims at Hiroshima and Nagasaki. We once did, but they seemed more like a curiosity than anything. We have written to the directors of the visitor centers at Hiroshima and Nagasaki and have offered to set aside space, but so far they have not followed through. We would include pictures of victims, but only in an exhibit designed and developed by Japanese.

Future plans call for the display of pertinent quotes in the lobby from historical "heavies," and updating energy displays. "We're trying to get people to think in terms they haven't," said Canfield. "It's better to let people learn themselves without forcing it into them." A short-term project will include minimal labelling of the outdoor aircraft and missiles.

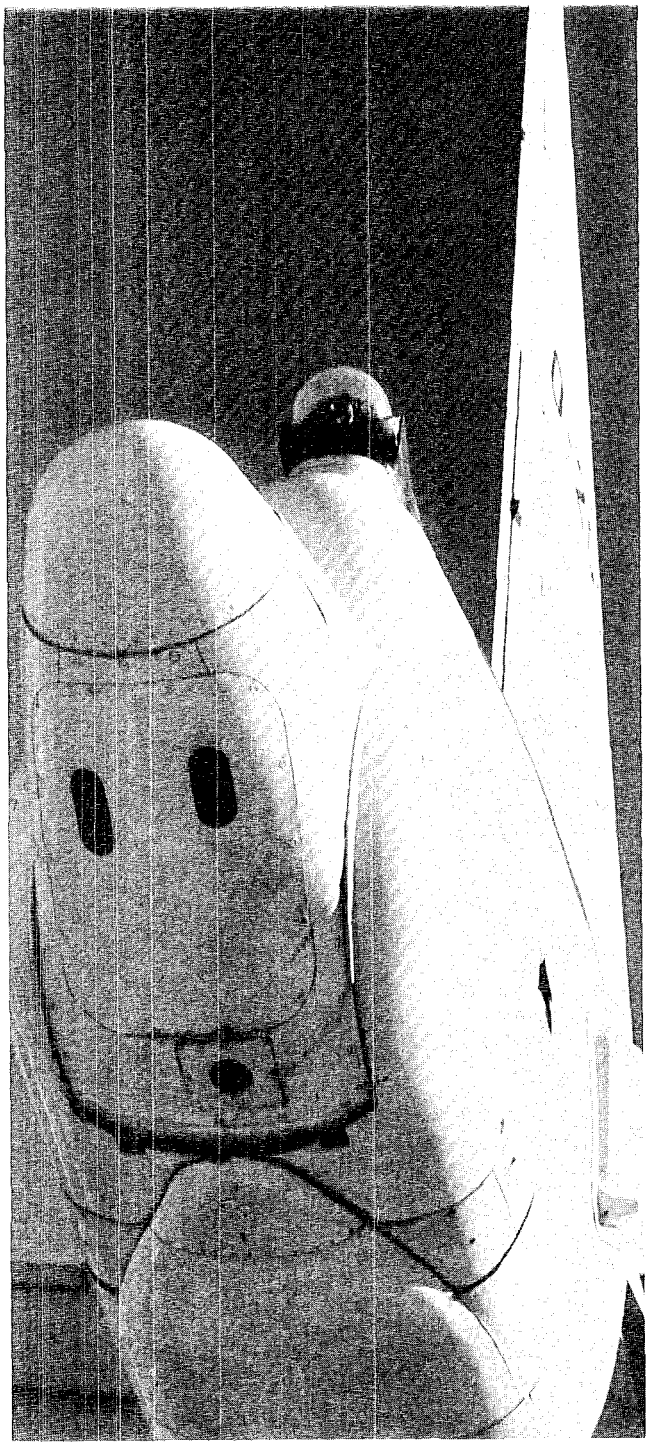
*'It's hard to find unclassified pictures with people; action photographs of the older days'*



**This Hound Dog projectile was designed to fit under the wing of a B-52 bomber.**


A detail from the fuselage of the giant B-52 bomber on display; this craft carried weapons and diagnostic equipment during the last series of atmospheric nuclear tests in the early 1960s.

*The B-52 actually carried weapons and diagnostic equipment in the last series of atmospheric tests conducted*



Aft section of the B-52, with bubble tail turret.

**B-52 from test years**

One outdoor region will be devoted entirely to solar energy and wind; a turbine and a collector have been acquired so far. Items from military history include a Hound Dog device which fits under the wing of a bomber; the Redstone, Minuteman, Snark, Polaris, Mace, and Bomarc; and the actual B-52 that carried weapons and diagnostic equipment in the last series of atmospheric tests conducted with nuclear devices by the United States. There are 28 bomb casings on display indoors, and gear from the old Los Alamos Kiwi program.

The museum's total staff numbers 10; funding for operations comes from the Department of Energy.

You're invited to visit; just down the street from the men in the blue berets at the gate.

*Photo by LeRoy N. Sanchez*

CBS news correspondent Harry Reasoner, right, interviewed LASL Director Harold Agnew for a December version of the "60 Minutes" documentary series. The film crew also visited with Edward Knapp, leader of the Accelerator Technology (AT) Division, during their November stay.

*Photo by LeRoy N. Sanchez*

Colonel Donald Panzer (right), Deputy Commander, U.S. Army Nuclear and Chemical Agency, visited LASL after he replaced Colonel Gray Parks at that position. With him on tour at the new plutonium facility was Wilbur McNeese, CMB-11.

# Among our guests

*Photo by Bill Jack Rodgers*

About 30 members of the Military Liaison Committee, responsible for interfacing between the Department of Energy and the Department of Defense on nuclear weapons, toured LASL facilities in November. The 30-person committee is headed by James P. Wade, Jr., assistant to the Secretary of Defense for atomic energy.

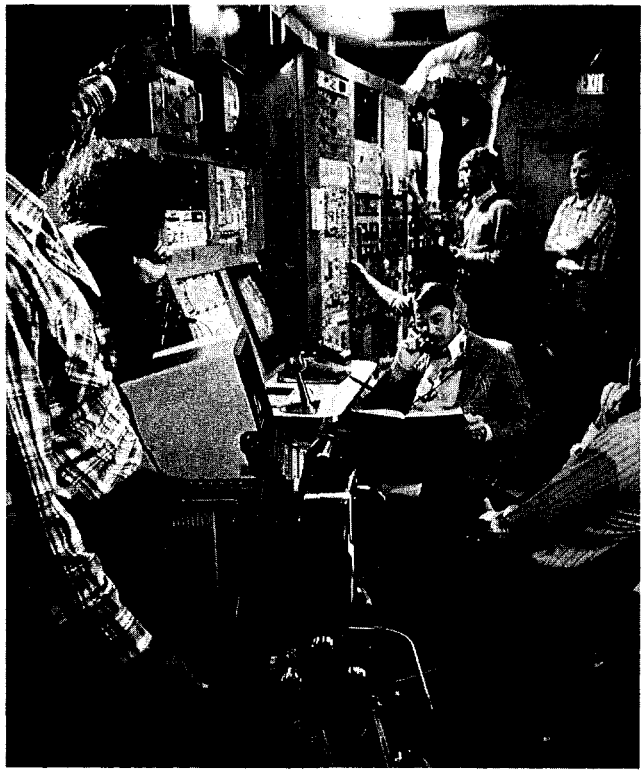


*Photo by LeRoy N. Sanchez*

A NOVA television crew filmed at the eight-beam Helios laser system for a show to be aired in early 1979 on public broadcasting stations. Seated at center is Joe Ladish, L-1, of the Helios operations group.

# 10 Years Ago

## MANAGER'S APPOINTMENT

H. Jack Blackwell has been appointed as manager of the Los Alamos Area Office of the AEC. The appointment was made this week by Albuquerque Operations Manager H.C. Donnelly. Blackwell joined the AEC in Los Alamos in 1947 and later was appointed manager of the commission's San Antonio office in 1958 and has headed the Amarillo Area Office since 1965.

## VOTERS OKAY HILL CHARTER

The Charter Commission Tuesday night was happily surprised to discover that it was a winner. Los Alamos' second try at a charter passed by a 450 vote margin, 1809 to 1359. The 22-page charter will become effective January 1, 1969, and its passage will bring some peculiar effects: The treasurer-elect, Al Dyhre, and the county surveyor-elect, Charles Trask, will not take office, as the charter eliminated their posts. The three county commissioners-elect will become councilmen and are to be joined by four more members on June 1 of next year. Otherwise, the transitional effects are not expected to be drastic as Los Alamos becomes an incorporated county.

## NAMED TO BOARD

Los Alamos Scientific Laboratory Director Norris E. Bradbury has been named to the University of New Mexico Board of Regents by Governor David Cargo. He replaces Federal District Judge Howard C. Bratton of Albuquerque who has resigned. Bradbury will serve the remainder of Judge Bratton's unexpired term, until January 1, 1971.

## IAEA VISITOR

The Director General of the Internation Atomic Energy Agency, Sigvard A. Eklund, visited the Los Alamos Scientific Laboratory last week. The primary purpose of his visit was to discuss the work in Nuclear Safeguards Research and Development being carried on at LASL under the direction of G. Robert Keepin, N-6 group leader.

**Culled from the December, 1968**
**files of *The Atom* and the *Los Alamos Monitor***
**by Robert Y. Porton**

☆ U.S. GOVERNMENT PRINTING OFFICE 1978 - 777-125/10

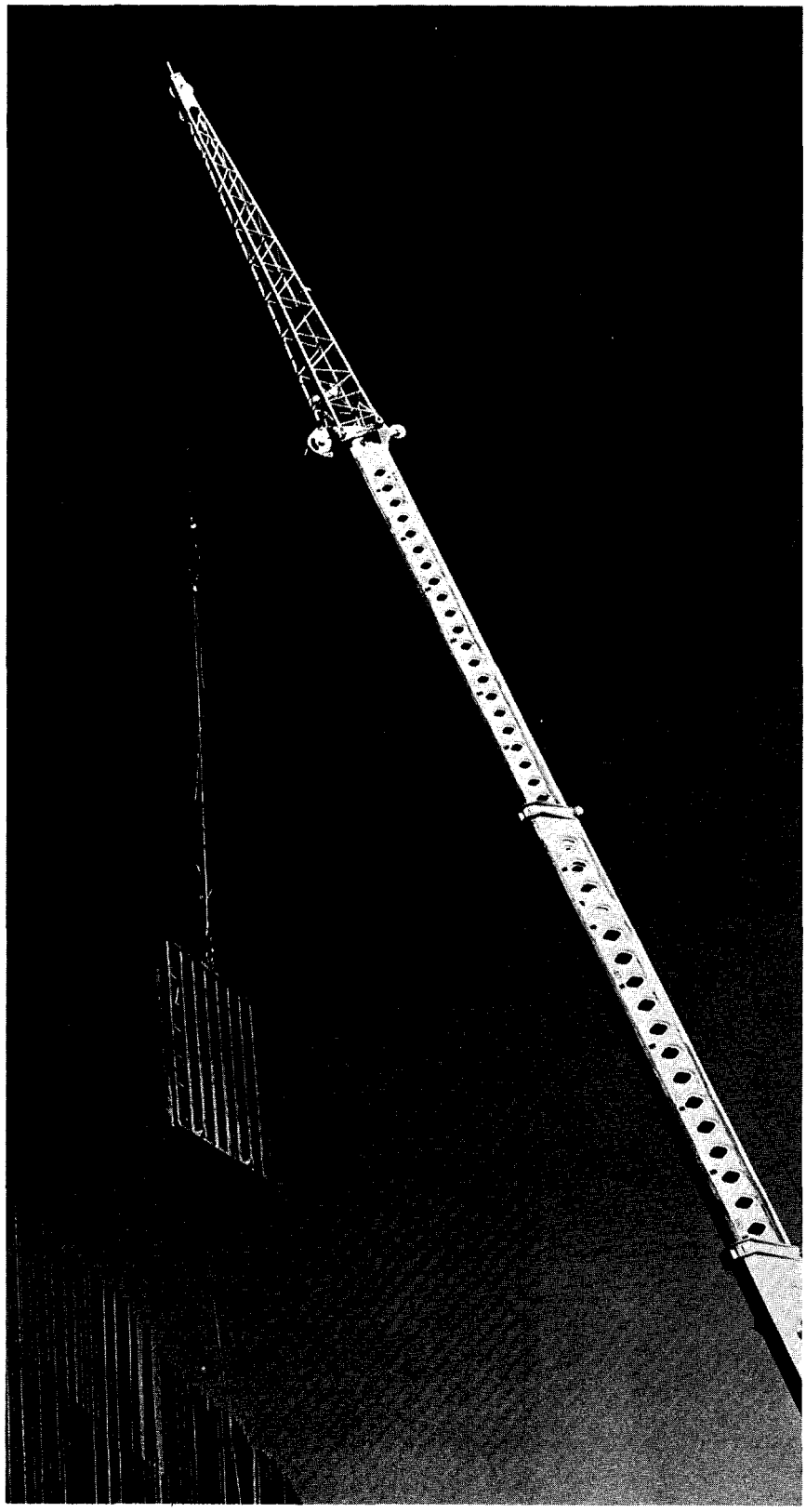
# A rising 'star'

Major construction — $9.1 million worth of a project estimated to cost between $50 and $60 million — is taking place at the High Energy Gas Laser Facility at TA-35. The facility will house Antares, a name taken from a giant star, intended to achieve a major milestone in the national laser fusion program. The 100-kilojoule system will deliver optical pulses on a target at 100 to 200 terawatts and is designed to demonstrate scientific breakeven, where thermonuclear energy released equals the laser energy input.

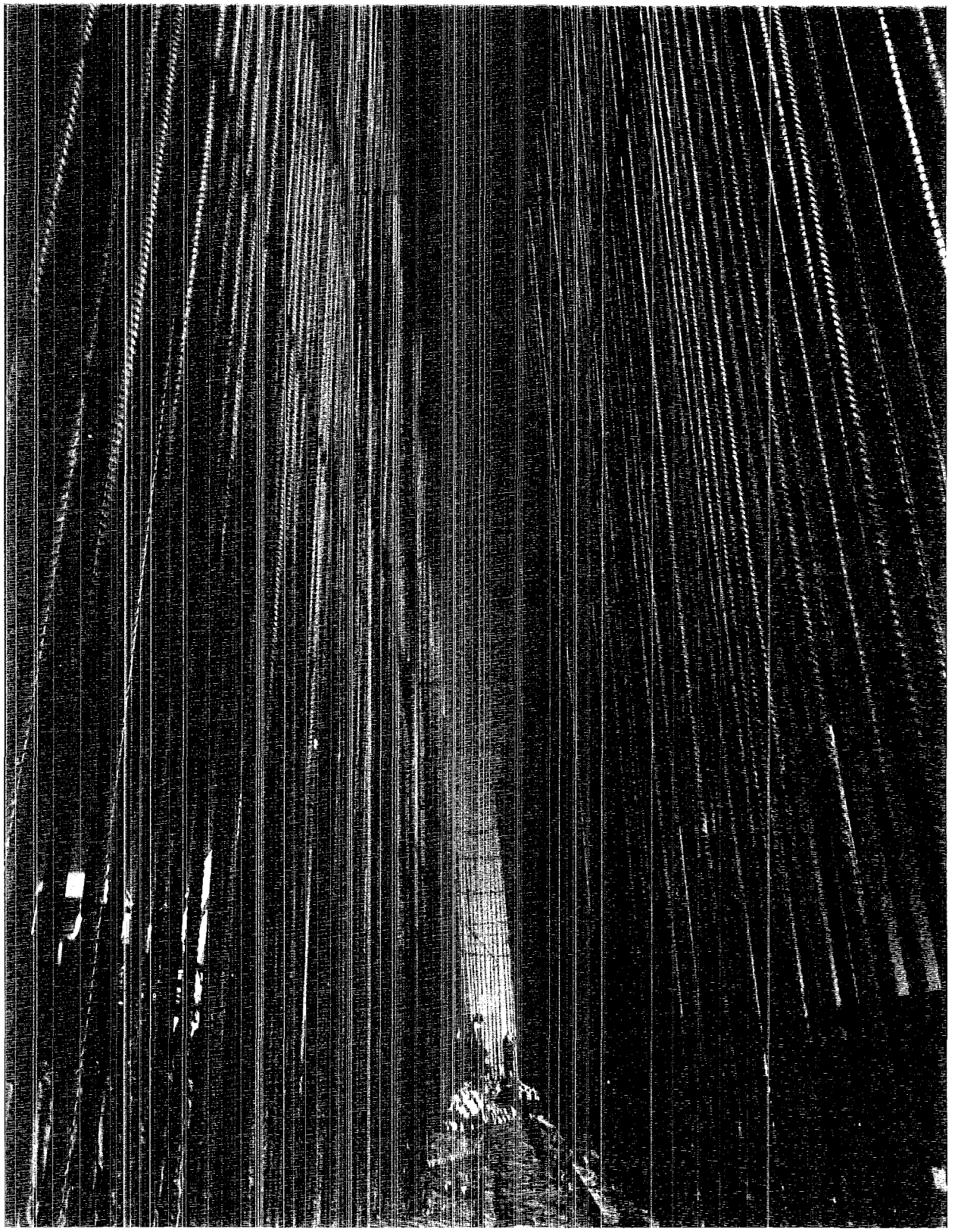
Site construction began in September, 1977, and completion is scheduled for late in 1983. Now about 50 per cent complete, the five buildings have a total of 90,000 square feet and will be finished by August, 1979. Hardware for the 72-beam laser system will then be installed by the Laser Research and Technology (L) Division.

The eight-beam Helios laser is providing research to produce the proper microscope targets for Antares. An additionally important application of the Antares facility is for basic weapons physics phenomena and simulation experiments in support of the nuclear weapons program. This work will be done cooperatively with other divisions at Los Alamos, with support from the Office of Laser Fusion and the Office of Military Applications (both in the Department of Energy).

Briefly, laser fusion involves depositing a great quantity of energy on a target filled with deuterium and tritium gas, causing the nuclei to fuse and release energy — the process that occurs in a star.

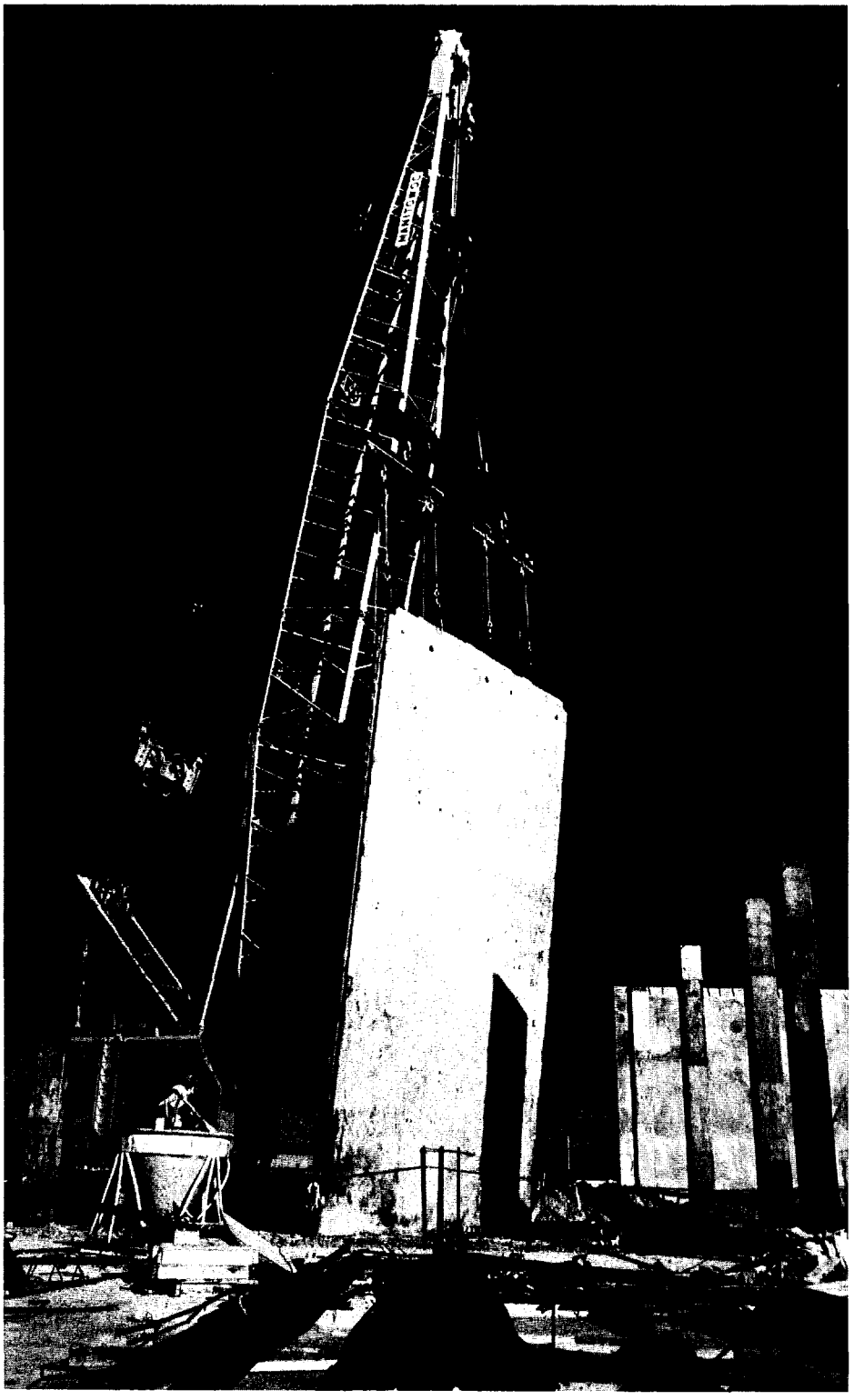


**Prefabricated forms, used for pouring concrete walls at the Antares target building, are lowered into place. In the floor of the laser hall is being installed a copper grounding mat to insure proper grounding of the pulsed power equipment.**



Staggering amounts of concrete are needed for Antares. The target building alone requires 9,230 cubic yards in its walls and roof to attenuate the 14 million electron volt neutron yield from the fusion targets to a safe level outside the building.

MOTZ HENRY THOMAS
3187 WOODLAND RD
LOS ALAMOS NM
87544



A 67-ton precast wall panel, standing nearly 43 feet high, is installed at the laser building. This high bay area encompasses a 208-by-95 foot area and will house the power equipment that amplifies the laser pulses. Other construction photos are inside.